SHOE WITH A FLAT FORMED SHOE UPPER

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ABSTRACT

Shoes specifically designed to facilitate production via efficient shoe manufacturing methods and systems are described. In embodiments, the shoe upper is designed by way of a flat forming process, whereby the upper pattern is kept in a two-dimensional shape for most of the upper assembly and then stitched or otherwise affixed into a three-dimensional form in the final stage of upper assembly.
150

VAMP

160

VAMP OVERLAY

162

QUARTER

164

COLLAR LINING & TONGUE LINING

166

TONGUE LINING TPU, & TPU EYESTAY

168

COLLAR FOAM & TONGUE FOAM

170

TONGUE

172

TONGUE TPU & VAMP REINFORCEMENT

174

EYESTAY REINFORCEMENT

176

FIG. 1B
SHOE WITH A FLAT FORMED SHOE UPPER
CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 61/194,403, filed Sep. 26, 2008, entitled “Shoe With A Flat Formed Shoe Upper.”

TECHNICAL FIELD

[0002] The present invention relates to athletic footwear. More particularly, the present invention relates to a shoe with a flat formed shoe upper.

BACKGROUND OF THE INVENTION

[0003] Shoes, especially shoe uppers, have traditionally been assembled from a relatively large number of threedimensional components. Both the large number and the threedimensional nature of these components have required a great deal of labor to assemble a single shoe. Decreasing the labor required to manufacture a shoe by a meaningful amount is not possible with standard shoe designs.

SUMMARY OF THE INVENTION

[0004] The present invention relates to a shoe specifically designed to facilitate production via efficient shoe manufacturing methods and systems. These shoe designs and/or manufacturing methods reduce the specialized individual labor required for shoe production, while avoiding high costs associated with highly automated manufacturing equipment. Shoes in accordance with the present invention may further permit a customer to select a particular model of shoe, select functional options for the shoe and/or select aesthetic options for the shoe.

BRIEF DESCRIPTION OF THE DRAWING

[0005] FIG. 1A illustrates the initial layering step for upper creation, in accordance with the present invention;
[0006] FIG. 1B illustrates examples of upper components associated with the layering step depicted in FIG. 1A, in accordance with the present invention;
[0007] FIG. 2 illustrates a step for upper creation involving a heat press, in accordance with the present invention;
[0008] FIG. 3 illustrates a step for upper creation involving cutting out a pattern perimeter, in accordance with the present invention;
[0009] FIG. 4 illustrates a step for thermoforming shoe construction involving the attachment of a heel-quarter element to a tongue-toe element, in accordance with an embodiment of the present invention;
[0010] FIG. 5 illustrates a step for thermoforming shoe construction involving lasting, in accordance with an embodiment of the present invention;
[0011] FIG. 6 illustrates a step for thermoforming shoe construction involving sole laying, in accordance with an embodiment of the present invention;
[0012] FIG. 7 is a perspective view of a finished thermoform construction basketball shoe, in accordance with an embodiment of the present invention;
[0013] FIGS. 8A-C are lateral side elevational views of examples of thermoform construction basketball shoes, in accordance with an embodiment of the present invention;
[0014] FIG. 9A is a top plan view of a finished thermoform construction skate shoe, in accordance with an embodiment of the present invention;
[0015] FIG. 9B is a lateral side elevational view of a finished thermoform construction skate shoe, in accordance with an embodiment of the present invention;
[0016] FIG. 9C is a front view of a tongue associated with the skate shoe depicted in FIG. 9A, in accordance with an embodiment of the present invention;

DETAILED DESCRIPTION OF THE INVENTION

[0017] FIG. 9D is a profile view of a tongue associated with the skate shoe depicted in FIG. 9A, in accordance with an embodiment of the present invention.

[0018] Shoes, in accordance with the present invention, are designed to enable efficient manufacturing, and optionally, customization. Shoe model options in accordance with the present invention may include, for example, a running shoe model, a basketball shoe model, and a skate shoe model. In accordance with the present invention, upper forms of shoes may be manufactured by a flat forming construction process, whereby the upper pattern is kept in a two-dimensional shape for a substantial amount of the upper assembly and is then stitched or otherwise affixed into a three-dimensional form in the final stage of upper assembly. The flat forming process minimizes the amount of labor, such as labor intensive stitching traditionally needed to assemble a three-dimensional upper form. The upper forms are then coupled with midsole and/or outsole structures designed to permit efficient shoe production.

[0019] Referring now to FIG. 1A, the initial layering step 100 for upper creation, in accordance with the present invention, is illustrated. In step 100, shoe upper components (e.g., upper elements) and hot-melt films (not shown) may be cut and arranged in between a lining layer 105 and an external layer 110. The upper components layered in between lining layer 105 and external layer 110 may include: internal foams 115, 117, and 119; a lining foam 120; and reinforcement pieces 125, 127, and 129. Lining layer 105 may include a moisture-wicking textile for removing excess moisture from the area immediately surrounding the foot. Suitable materials for lining layer 105 include polyester and recycled polyester, although other types of materials, including natural materials may be used. Other suitable materials for lining layer 105 will become readily apparent to those skilled in the art, given the benefit of this disclosure.

[0020] In step 100, internal foams 115, 117, and 119 of different shapes and sizes as illustrated in FIG. 1A may be placed upon lining layer 105. Internal foams 115, 117, and 119 may be cut into shapes consistent with conventional shoe design and may include, for example, a collar, vamp, quarter, and tongue. Internal foams 115, 117, and 119 may enhance the structure and comfort of the upper and can be formed of material such as polyurethane foam.

[0021] Lining foam 120 may be layered over the internal foams 115, 117, and 119 in step 100. Lining foam 120 forms a barrier between lining layer 105 and external layer 110, and may enhance the comfort and three-dimensional form of the shoe. In alternative embodiments of the invention, lining foam 120 may be replaced by a forming foam or other reinforcement materials conventionally used in shoe upper manufacture.

[0022] In step 100, reinforcement pieces 125, 127, and 129 of different shapes and sizes as illustrated in FIG. 1A may be
placed upon lining foam 120. Reinforcement pieces 125, 127, and 129 may be cut into shapes consistent with conventional shoe design and may include vamp and eyestay reinforcements. External layer 110 may be placed above the reinforcement pieces 125, 127, and 129 in step 100. External layer 110 forms the outer surface of the upper and may include textile elements for resisting abrasion and providing breathability. To enable the customer to customize the appearance of the upper, the external layer 110 may be altered by various dying, digital printing, embossing and embroidering techniques. Suitable materials for external layer 110 include synthetic leather and polyester mesh, although other materials including natural materials, may be used in accordance with the present invention. Other suitable materials for external layer 110 will become readily apparent to those skilled in the art, given the benefit of this disclosure.

In step 100, hot-melt films (not shown) may be layered amongst the upper components between lining layer 105 and external layer 110. Upon heat pressing, these films act to adhesively bond the upper components between lining layer 105 and external layer 110. The hot-melt films may be composed of materials such as thermoplastic polyurethane (TPU) film. The TPU film(s) may be integral to one or more sides of the other layers, such as lining layer 105 and for external layer 110.

Referring now to FIG. 1B, examples of various upper components associated with step 100 are illustrated and designated generally as reference number 150. Upper components 150 may be cut into shapes consistent with conventional shoe design and may include, for example, a collar, vamp, quarter, tongue, and heel counter. Specifically, vamp 160 is a part of the shoe that covers the instep and may extend over the toe. The vamp overlay 162 may cover at least a portion of the vamp. The quarter 164 is part of the shoe’s upper, and may cover the sides and back of the foot. In many cases, the quarter is attached by some means (e.g., sewn, glued) to the vamp. The collar lining and tongue lining, as shown by 166 and 168, simply provide a lining for these parts of the shoe and may be made out of a variety of materials, such as TPU, as discussed above. The eyestay shown in 168 allows for the shoe to be laced. The collar and tongue foam 170 are simply pieces of material, here foam, that are formed or placed into the collar and tongue to give these parts of the shoe shape and also to provide comfort to the wearer of the shoe. The tongue 172 is a piece of material that typically is placed in the top-center of the shoe and sits on the top part of the foot. The tongue 172 also may protect the top part of the foot. A tongue made from TPU and a vamp reinforcement 174 are also illustrated in FIG. 1B, as well as an eyestay reinforcement 176.

Referring now to FIG. 2, the heat press step 200 for upper creation in accordance with the present invention is illustrated. In heat press step 200, the layers from step 100 may be heat pressed together to form a basic laminated upper form, designated generally as 205. Upper form 205 is formed when the layers from step 100 are heated under pressure. The specific temperature, pressure, and time needed to laminate the upper form may vary according to the upper component being treated. For example, proper laminating of the quarter upper component may occur when treated at a pressure of 25 bars at 135 degrees Celsius for thirty seconds, and proper laminating of the tongue upper component may occur when treated at a pressure of 25 bars at 130 degrees Celsius for forty-five seconds.

Referring now to FIG. 3, the third step 300 for upper creation in accordance with the present invention is illustrated. In step 300, the pattern perimeter 310 of basic laminated upper form 205 is cut out to form upper component 305. Step 300 may be performed using any type of cutting device such as a cutting die, shears, and the like.

As FIGS. 1-3 have not been described, a method for constructing a shoe using a flat forming process will be disclosed. The upper portion of a shoe may be constructed by first layering a plurality of upper elements and hot-melt films in between a lining layer and an external layer, as shown in FIGS. 1A and 1B. These upper elements may include, for example, internal foams, a lining foam, and reinforcement pieces. In one embodiment, one or more of these upper elements are formed of polyurethane foam. The hot-melt film may be thermoplastic polyurethane, in one embodiment, but in other embodiments, may be made of another material. The upper elements and hot-melt films may be heat pressed between the lining and external layers to generate one or more basic laminated upper forms, as further shown in FIG. 2. Additionally, the pattern perimeters of the upper may be cut out of the basic laminated upper forms, shown in FIG. 3.

Referring now to FIG. 4, the step 400 for thermoforming shoe construction involving attachment of the heel-quarter element to a tongue-toe element in accordance with an embodiment of the present invention is illustrated. In step 400, a heel-quarter element 405 may be attached to a tongue-toe element 420 to form a three-dimensional upper form 440. The heat-quarter element 405 is a piece of a laminate upper component constructed according to steps 100, 200, and 300 illustrated in FIGS. 1-3.

Heel-quarter element 405 may include a heel area 410 and quarter panels 415. To properly form heel area 410, heel-quarter element 405 may be subject to thermoform thermoforming processes. The thermoform heel-forming processes may involve heat pressing the heel counter upper component, as shown in FIG. 1A, into a heel shape, then chilling the heel counter component. A dart (not shown) may be inserted at the top or bottom of heel area 410 of heel-quarter element 405 to facilitate the formation of a smooth heel. This thermoform heel-forming process may give the heel-quarter element 405 a three-dimensional shape.

Similar to the formation of heel-quarter element 405, tongue-toe element 420 may be a single piece made from steps 100-300 of FIGS. 1-3. Tongue-toe element 420 includes a tongue 425 attached to a toe-box region 430. In step 400, upper form 440 may be constructed by affixing the toe-box region 430 to the heel area 410 by, for example, stitching, gluing, RF welding, ultrasonic welding, or any other technique. Upper form 440 may then be fitted with a strobol (not shown), such as a last, for further construction and to shape the upper.

Referring now to FIG. 5, the lasting step 500 for thermoforming shoe construction in accordance with an embodiment of the present invention is illustrated. In lasting step 500, last 510 may be inserted into upper form 505 to properly shape the upper.

Referring now to FIG. 6, the sole laying step 600 for thermoforming shoe construction in accordance with an embodiment of the present invention is illustrated. In sole laying step 600, upper form 605 may be aligned and attached to sole unit 620. Sole unit 620 may include a phylon midsole 610, a rubber outsole 615, and a flange(s) (not shown). For example, upper form 605 may be attached to the flange of
midsole 610 using conventional shoe manufacture techniques such as, for example, stitching, gluing or a combination thereof. The attachment flange may surround the entire perimeter of midsole 610, or may be at a plurality of points or regions around the perimeter of midsole 610. The flange may be of a different hardness than other portions of midsole 610. Upper form 605 may be attached to sole unit 620 by stitching, gluing, etc.

[0033] Referring now to FIG. 7, a perspective view of a finished thermoform construction basketball shoe 700 in accordance with an embodiment of the present invention is illustrated. Basketball shoe 700 includes an upper 705 attached to a sole unit 710. Sole unit 710 is comprised of phylon midsole 715 attached to an outsole 720, as further described above in the discussion of FIG. 6.

[0034] Referring now to FIGS. 8A-C, lateral side elevational views 800 of examples of thermoform construction basketball shoes in accordance with an embodiment of the present invention are illustrated and designated generally as 810, 820, and 830 respectively. FIGS. 8A-C illustrate different options available in accordance with the present invention. For example, a shoe can include a standard graphic design as depicted in FIG. 8A, or the shoe can be decorated with variety designs as depicted in FIG. 8B-C.

[0035] Referring now to FIGS. 9A-B, top plan and lateral side elevational views of a finished thermoform construction skate shoe in accordance with an embodiment of the present invention are illustrated and designated generally as reference numeral 900. Skate shoe 900 includes an upper 905 attached to a sole unit 910. Sole unit 910 is comprised of midsole 915 attached to an outsole 920. Skate shoe 900 may be further comprised of perforations 925 in upper 905, emboss eyelets 930, a thick foam collar 935, an overlay durable synthetic toe tip 940, and eyestay reinforcements 945.

[0036] Referring now to FIGS. 9C-D, front and profile views of a tongue associated with the skate shoe depicted in FIG. 9A are illustrated and designated generally as reference numeral 950. In one embodiment, tongue 950 may be comprised of a thick 20 mm foam. The exterior layer 955 of tongue 950 may be decorated with a debossed logo 960.

[0037] The present invention has been described in relation to particular embodiments, which are intended in all respects to be illustrative rather than restrictive. Alternative embodiments will become apparent to those of ordinary skill in the art to which the present invention pertains without departing from its scope.

[0038] From the foregoing, it will be seen that this invention is one well adapted to attain all the ends and objects set forth above, together with other advantages which are obvious and inherent to the system and method. It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

What is claimed is:

1. A shoe designed to facilitate a system for manufacturing shoes customized to an order placed by a customer, the shoe comprising: an upper, where the upper is manufactured by a flat forming construction process, the flat forming construction process comprising: layering a plurality of upper elements and hot-melt films in between a lining layer and an external layer; heat pressing the upper elements and the hot-melt films between the lining layer and the external layer to generate one or more basic laminated upper forms; and cutting out along pattern perimeters of the basic laminated upper forms.

2. The shoe of claim 1, wherein the hot-melt film is thermoplastic polyurethane (TPU).

3. The shoe of claim 1, wherein one or more of the upper elements are formed of polyurethane foam.

4. The shoe of claim 1, wherein the upper elements include one or more of internal foams, a lining foam, and reinforcement pieces.

5. The shoe of claim 4, wherein the internal foams are shaped consistent with various portions of the shoe, and include one or more of a collar, a vamp, a quarter, and a tongue of the shoe.

6. The shoe of claim 4, wherein the lining foam forms a barrier between the lining layer and the external layer to enhance comfort and provide a three-dimensional form of the shoe.

7. The shoe of claim 4, wherein the reinforcement pieces include one or more of a vamp reinforcement or an eyestay reinforcement.

8. The shoe of claim 1, wherein the external layer is made from one or more of synthetic leather or polyester mesh.

9. The shoe of claim 1, wherein the external layer forms an outer surface of the upper and allows for customization of an appearance of the upper in that various customization processes can be performed to the upper including one or more of dying, digital printing, embossing, or embroidering.

10. An upper portion of a shoe assembled using a flat forming construction process according to a method comprising: while maintaining a two-dimensional shape, layering a lining layer, one or more upper components, and an external layer to form the upper portion of the shoe, wherein a size and a shape of the upper components vary based on one or more of which portion of the shoe is being assembled, a type of shoe, and a size of shoe being assembled; adhering the lining layer, the upper components, and the external layer together by way of a heat press, wherein hot-melt films are also layered in between the lining layer and the external layer to bond the layers together; and cutting out the upper portion of the shoe along an upper perimeter.

11. The method of claim 10, wherein the upper components are in the shape of one or more of a collar, a vamp, a quarter or a tongue of the shoe.

12. The method of claim 10, wherein one or more reinforcement pieces are also layered in between the lining layer and the external layer to provide more support for the upper portion of the shoe.

13. The method of claim 10, further comprising forming a three-dimensional upper by affixing two or more upper portions of the shoe, wherein the two or more upper portions of the shoe include one or more of a heel-quarter element or a tongue-toe element.

14. The method of claim 13, further comprising inserting a last into the three-dimensional upper.

15. The method of claim 14, further comprising attaching the three-dimensional upper to a sole unit, wherein the sole unit includes a midsole and an outsole.

16. A shoe designed to facilitate a system for manufacturing customizable shoes, the shoe comprising: an upper whose components are manufactured by way of a flat forming process wherein the components of the upper maintain a two-dimensional shape throughout their formation, and wherein the upper comprises: a heel-quarter element that includes a
heel area and multiple quarter panels; and a tongue-toe element that includes a tongue and a toe-box region, wherein the tongue-toe element is secured to the heel-quarter element to form a three-dimensional upper form.

17. The shoe of claim 16, wherein the tongue-toe element is secured to the heel-quarter element by way of one or more of stitching, gluing, RF welding, or ultrasonic welding.

18. The shoe of claim 16, wherein the heel-quarter element and the tongue-toe element are manufactured by a method comprising: layering a plurality of upper elements and hot-melt films in between a lining layer and an external layer; heat pressing the upper elements and the hot-melt films between the lining layer and the external layer to generate one or more basic laminated upper forms; and cutting out along pattern perimeters of the basic laminated upper forms.

19. The shoe of claim 18, wherein the external layer may be customized using a customization process that includes one or more of dying, digital printing, embossing, or embroidering.

20. The shoe of claim 18, wherein the upper elements include internal foams, a lining foam, and reinforcement pieces.

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